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Abstract

This paper suggests movement toward a more market-oriented human resource development planning and budgeting system.

It considers how historical technical coefficients used in estimating manpower requirements underestimate employer upgrading as relative salaries of educated labor fall (1986-89), and export demands and technologies change.

Market signals for 1982-89 reveal falling but still relatively high real social rates of return to investment in junior and senior secondary education, unemployment rates that are initially high but fall sharply to 1-2% by age 29, and job search times that are shortest at the junior secondary level.

A method is suggested for adjusting real rates of increase in investment in education in response to these market signals given off by Indonesia's rapidly growing economy.

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AND DEMANDS IN INDONESIA

Walter W. McMahon, Boediono, and Abas Gozali*

There are rapid changes occurring throughout the world in the search for rising living standards away from the detailed planning of quantities of output with quotas and toward a more responsive market system. With the dramatic economic changes occurring in Eastern Europe for example it has become very obvious that a planning system that ignores differences in costs and in other market signals such as earnings and new kinds of job opportunities does not respond very efficiently. There is a price to be paid in failing to monitor and respond to the new emerging growth opportunities that are revealed by these market signals in the form of reduced efficiency and slower growth of living standards.

What are the implications of this for Indonesia's manpower planning system? Underdeveloped human resources are Indonesia's largest potential resource, so it is of considerable importance that this be done efficiently. But although in other areas Indonesia has moved to set up the infrastructure for an increasingly responsive market oriented system, including an export oriented growth strategy for example keyed to world market prices, and a new Jakarta stock market tapping world capital markets, the education and manpower planning system is still characterized by a very detailed specification of the number to be trained in each field. In particular, the high degree of regulation implemented through the rigid tracking within the educational system, and specification of numbers of faculty and numbers of students in each field contribute to surpluses in some fields and shortages in others. This results in limited capacities to adapt to relative costs or to emerging opportunities and hence in inefficiencies and waste.

This paper offers a "new view" of the process of planning to meet the manpower needs of the economy. It suggests moving toward a more generalized kind of "indicative planning" while strengthening the necessary infrastructure that allows deregulation of the detail and allows the more meaningful market signals to work.

This increased responsiveness to growth opportunities and greater efficiency in human resource development involves a more liberalized system allowing greater choice to individuals to respond quickly to opportunities. It also requires greater capacity of educational institutions to respond to the economy's needs in efficient ways aided by larger amounts of more objective information. But since it is inevitable that most education at all levels will indefinitely remain in the public sector, this "new view" also requires a much more intensive annual monitoring of the market signals on relative earnings, the costs of education, and job search times at all levels and in all fields annually with a much more active budgetary response to these signals of the economy's emerging needs.

As these and other aspects of the responsiveness to market signals are strengthened, then manpower planning would no longer need to specify detailed quantities of labor to be trained in each field for each industry. Instead

manpower planning would become indicative planning of broader goals and strategic planning for certain types of capacities requiring very long lead times. These include for example the number of engineering colleges to be built, and the location and character of the smaller and more costly Ph.D programs to avoid overlap. The annual monitoring of the market signals such as the earnings of graduates at each level, costs of education, economic rates of return to each level, unemployment rates, and job search time leading to annual (3 year rolling) budget adjustments responding to these market signals would then become the key planning activity.

This process of monitoring the market signals is considered below. Part I starts with an evaluation of the current manpower planning estimates in light of the emerging information from the market signals given off by a growing economy. Part II presents the evidence offered by the market signals in Indonesia for 1982-89 together with a description of the suggested market-oriented strategy. It includes an appraisal of the sources of the errors inherent in the manpower planning methodology in relation to what can reasonably be expected from market signals and cost benefit information.

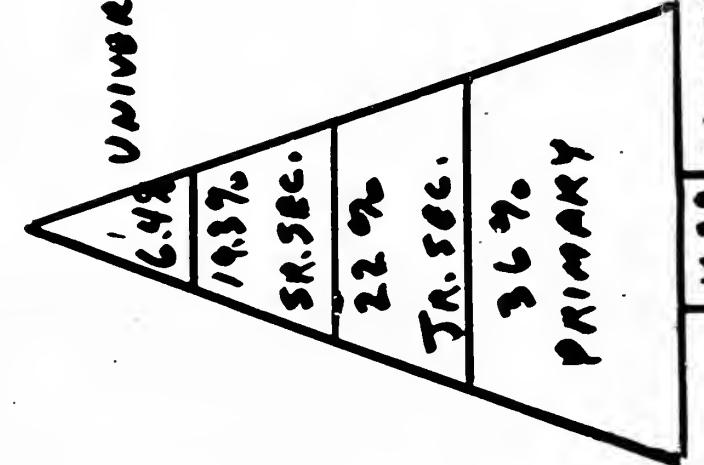
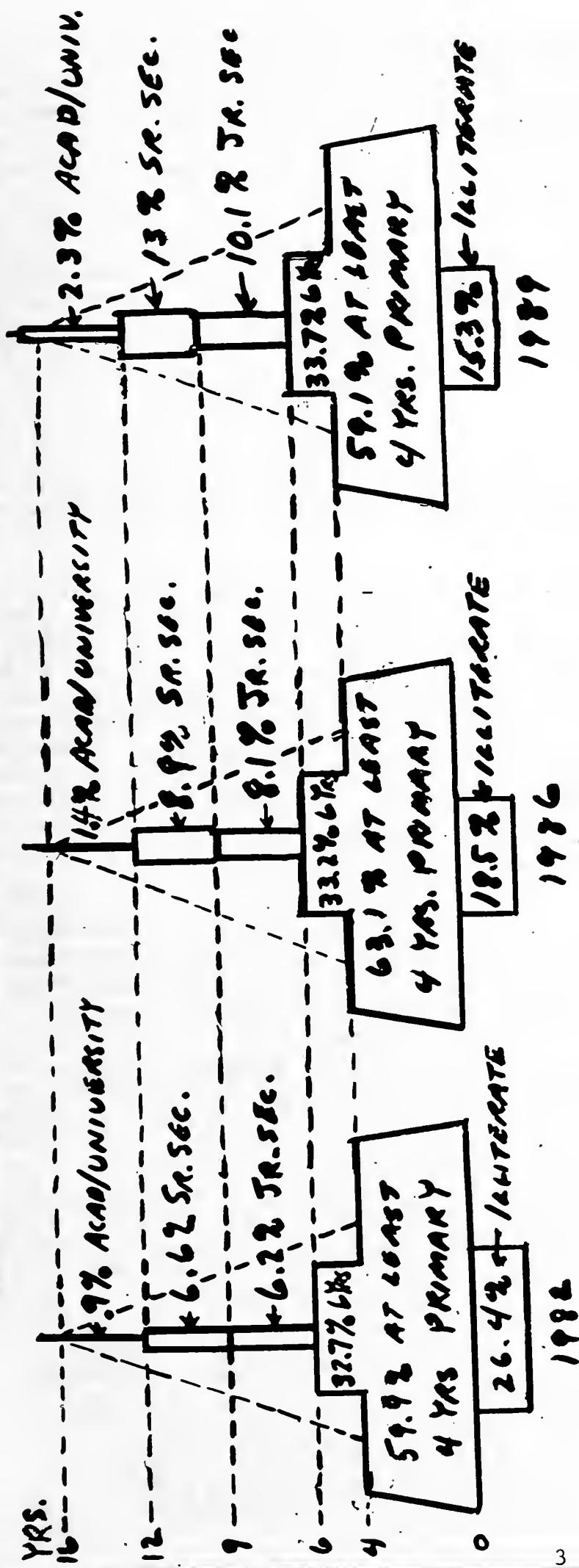
I. Underlying Factors

The rapid growth of the Indonesian economy continues to place heavy demands on the job market for increase in the supplies of labor with different levels and types of education.

The Problem With the Manpower Demand Estimates

The problem is that the manpower planning "requirements" methods alone based on historical Indonesian data is arriving at inconsistent results on the demand side and does not anticipate these growth needs accurately. Manpower "requirements" based on fixed (or dynamic) coefficients reflect high past utilization of workers with primary education or less, because that is essentially all that has been available in the labor force for many years (See Figure 1 for 1982, 1986, and 1989 for example). But employers upgrade the educational requirements that they demand within each standard occupational category as better workers become more available (and their wages become relatively lower). This aids exports, and also helps to adapt to the technologies required by the world economy as they change in ways not anticipated by the manpower requirements. To cite just one example, primary school teachers in Indonesia included untrained parents during the war for independence in the 60's, but were required to have 9 years of education in the 70's, and now are required to have 12 years through the senior secondary level. These better educated teachers are better equipped with the knowledge and skills needed to educate primary school children effectively and hence are more productive in producing the required reading, writing, numeracy, and problem-solving skills in their students. But the fixed technical coefficients in the manpower requirements approach do not allow for this "upgrading" in each occupational category. Even dynamic coefficients based on historical Indonesian data do not anticipate the size and direction of the changes accurately. The latter is because the historical data show relatively little change at the secondary school levels for many years, (See Figure 1, 1982 and 1986).

Educational Structure of Indonesia's Labor Force



SOUTH
KOREA
1975
(TAKE-
OFF)

SHORTAGE OF EDUCATION
IN THOSE LARGEST
AS INDICATED BY THE DASHED LINES
GIVEN BY MARCH 1975
AND BY COMPARISONS
TO SOUTH KOREA
AT TAKE-OFF

The inconsistencies generated in the past by the manpower requirements approach can be seen by comparing the primary and junior secondary levels in the current labor force shown in Tables 4, 5, and 6 with Tables 2 and 3. It would be best if these "requirements" were regarded only as first approximations and fine tuned using market signals information. Large shortages of primary (6.3m) and small shortages of junior secondary school graduates (.289m) in the labor force were reported as net manpower "requirements" for 1988-1993 in BAPPENAS/DEPDIKBUD/DEPNAKER/BPS (1989) as shown in Column 4, Table 10. However smaller shortages are reported at the primary level, but there are still large surpluses reported at the senior secondary general level in the new manpower estimates (See Table 10, Col. 5 below from DEPNAKER 1991, p. 27). These all use basically the same manpower requirements methods based on historical labor utilization rates.

The Regulation of Quantities

The problems with specifying quantities of workers to be trained using manpower "requirements" are the same as those that arise in setting production quotas in other sectors of economic activity.

No Substitution Anticipated. The fixed technical coefficients typical of all input output analysis assume a linear production function such as that shown in Figure 2 to estimate labor "requirements" (L_1 and L_2) to produce the output (Y) in each industry. This Leontief-type production function used in some types of planning implies right angled isoquants such as YoYo in Figure 1 which allow no substitution as relative prices change. However such substitution does occur in the economy. For example, at a low wage for persons with primary education or no school (L_1) relative to secondary school grades (L_2) as shown by the relatively steep price line AA, the same quantity of secondary school graduates would be expected to be hired by firms who optimize as would be hired if the relative earnings of secondary school graduates were lower as given by price line BB (i.e., $Q_1 = Q_2$).

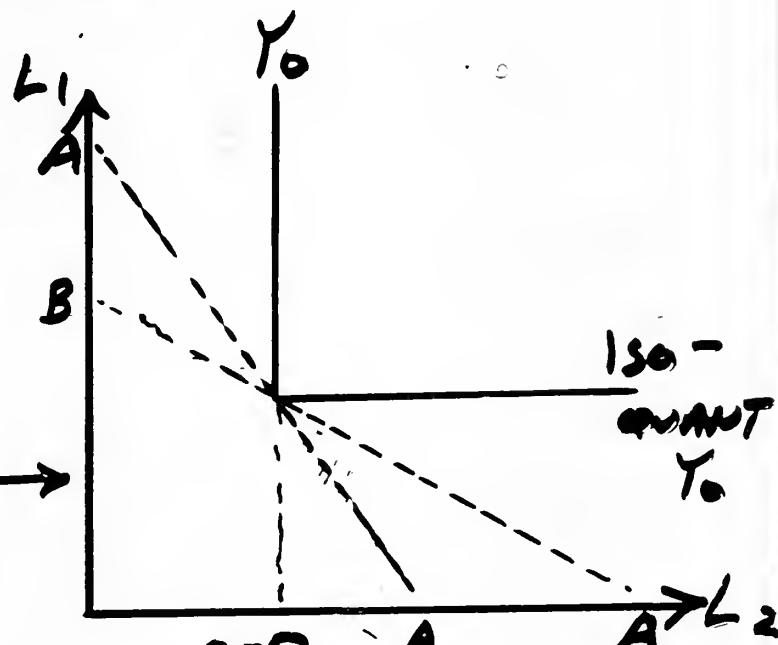
However substitution will occur, since the curved isoquant given by the non-linear generalized Cobb-Douglas production function shown below in Figure 2 is more realistic. Table 1 shows how the relative earnings of secondary school and academy graduates in Indonesia have been falling from 1986 through 1989 at least. Their real earnings have fallen on the average by about 20% during the period, whereas except for those in the very young 15-20 age ranges, real earnings of those with primary school or less have remained essentially steady. This suggests that employers will eventually start to substitute, using persons with more secondary education who are becoming relatively cheaper. That is, they are likely to "upgrade" the education requirements in each occupation category because of this change in relative prices. The substitution is shown in Figure 2 in the bottom frame, where employers who optimize will tend to substitute from 1 to 2, using more secondary school graduates and fewer workers with primary schooling or less over time.

FIGURE 2

TECHNICAL ECONOMIC PROBLEMS WITH THE
MANPOWER REQUIREMENTS APPROACH

I. 1.) NO SUBSTITUTION
 (LINEAR PRODUCTION
 FUNCTIONS)

$$Y = \frac{1}{f_1} L_1 + \frac{1}{f_2} L_2 + \frac{1}{f_3} K \rightarrow$$

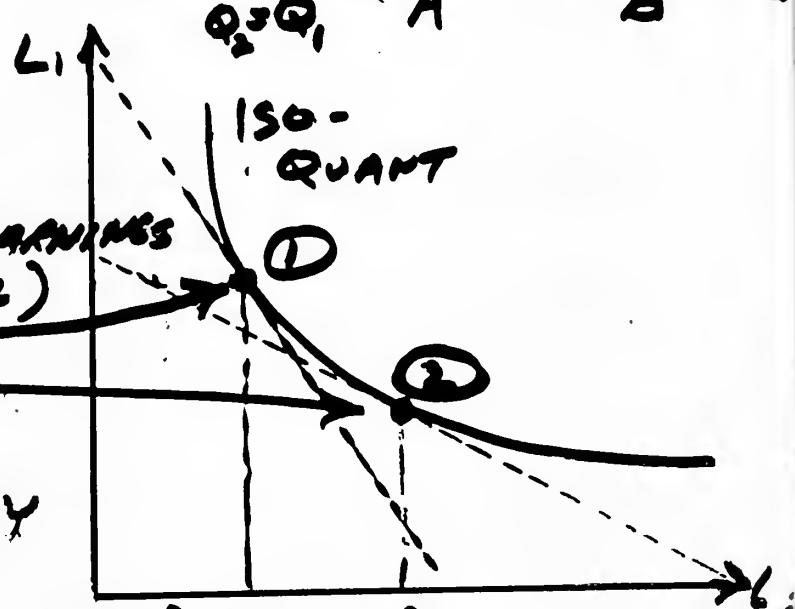


$$(Y = L_1^{d_1} L_2^{d_2} K^{d_3})$$

GENERALIZED COST-DOUGLAS - MORE
 REALISTIC WHEN EARNINGS
 OF SEC. GRADS FALL)

II. COSTS IGNORED:

RELATIVE RESOURCE
 SCARCITIES IGNORED BY
 "REQUIREMENTS".
 (COSTS ARE A MARKET SIGNAL.)



III. RETURNS IGNORED : 1.) GROWTH OPPORTUNITIES
 MISSED; 2.) LABOR MARKET MONOPOLIES PERSIST
 (EARNINGS ARE A MARKET SIGNAL)

IV. THE RESULT -

A. EXAMPLE: - INDONESIA'S LONG DEGRADATION
 OF 15-20 yrs. IN EXPANDING
JUNIOR SECONDARY EDUCATION

Table 1

Trends in Average Earnings (Annual Wage)
 In Current and Constant (1989) Prices, (Thousands of Rupiah)
 All Urban Workers, Male

	Current Prices			Constant (1989) Prices			% Change Real Terms 1986-89
	1986	1988	1989	1986	1988	1989	
<u>No School</u>							
Age 15-20	380	428	712	465	454	712	+53%
31-50	688	669	888	842	710	888	+ 5%
<u>Primary</u>							
Age 15-20	508	546	621	621	579	621	0%
31-50	938	973	1,125	1,148	1,032	1,125	-2%
<u>Jr. Sec. Gen</u>							
Age 15-20	649	1,058	659	794	1,122	659	-20%
31-50	1218	1,031	1,448	1,490	1,093	1,448	- 3%
<u>Sr. Sec. Gen</u>							
Age 21-30	1084	1,106	1,101	1,326	1,173	1,101	-20%
31-50	1541	1,872	1,891	1,886	1,986	1,891	0%
<u>Sr. Sec. Voc</u>							
Age 21-30	1183	1,048	1,045	1,447	1,112	1,045	-28%
21-50	1736	1,751	1,768	2,125	1,888	1,768	-17%
<u>Academy</u>							
Age 21-30	1,495	1,662	1,459	1,829	1,763	1,459	-20%
31-50	2,095	3,111	2,205	2,564	3,300	2,025	-21%
<u>University</u>							
Age 21-30	1,472	2,042	1,760	1,802	2,116	1760	- 2%
31-50	2,298	2,406	2,686	2,812	2,552	2,686	- 5%

1987 1988 1989

Inflation Rate	9,3%	5,6%
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Index	1986=100	109,3
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115.4	122.4	
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Source : SAKERNAS 1986, 1988, and 1989 as reported in McMahon and Boed (1989, p.11) and 1988, 1989 as computed for this paper.

The incremental demands and supplies of manpower as given by the most recent Depnaker (1991) estimates after aggregation across industries have been broken down for each year in Table 2, with the net shortages or surpluses estimated for each year shown in Table 3. The supplies depend partly on demographic factors, but even more important, are largely policy determined. If the government invests more in the schools to improve the quality of education and reduce the direct cost to the parents (thereby encouraging them especially in the poor rural areas to save and invest the foregone earnings costs of their children so the children can remain in school), then this partnership with the parents will help to reduce dropouts. Table 2 provides for over 2 million additional children being accommodated at the junior secondary level by 1993, for example. So if the necessary funding is provided, the goal of universal basic education through 9th grade by 1993 will be attained. The accuracy of the supply-side estimates therefore depend heavily on the commitment to provide the funding. Given this, the goals would appear to be quite attainable.

The net shortages and surpluses by year shown in Table 3 however depend on the assumptions about the demand side discussed above. There are rising shortages estimated at the primary and below level from 1991 to 1993, and rising surpluses at the senior secondary general level. These do not reflect the upgrading in each skill category done by employers as the earnings of the senior secondary general graduates fall relative to the earnings of those with primary schooling and below as shown in Table 1. The optimal solution for employers moves from 1 to 2 as illustrated in Figure 1.

Another market signal is the costs of producing the education and skills through human resource development programs of all types. The costs are lower for the SMEA commercial vocational schools, for example, who produce persons trained in accounting, production management, finance, and other entrepreneurial skills needed by small and medium sized enterprises. This may be one reason the rates of return for these schools were found to be so high in the 1982 SUSENAS (24% for all occupations and 37% in small business for males for example, See McMahon, Millot, and Eng, 1986, p. 2-224). To cite a second example of the relevance of costs, the costs of vocational training on the job by firms sometimes can be lower, and more up to date and relevant, for certain firm-specific skills than in the more costly formal VOTEC school settings. These VOTEC schools now have 149 separately defined VOTEC curricula that keep each curricula below "a critical mass" and hence available only at high cost per student. The manpower requirements approach does not consider the importance of these or other relative costs when planning for specific quantities. (See for example N2 on the horizontal axis in Figure 3, which develops the difference between the way cost/benefit analysis (on the vertical axis) and the manpower requirements approach (quantities on the horizontal axis) look at the same labor market.) Cost however, which includes foregone earnings costs borne by the parents, as well as direct costs, are a very important economic signal that reflect the price of inputs and hence relative resource scarcities.

For efficiency, costs can also be very high if the returns are also high. Low costs alone do not bespeak efficiency. It is the costs in relation to the effectiveness, the latter as measured by the quality, and/or the returns that is the economic criteria for cost effectiveness and efficiency.

Table 2

Annual Increments to Labor Supplies and Demands
Anticipated by Use of the Manpower D&S Approach

SUPPLY

Level of Education	1989	1990	1991	1992	1993	Total
1. Primary + Below	1,326,015	1,203,154	1,062,457	947,451	835,506	5,374,583
2. Junior Sec. Total	424,746	440,347	324,927	510,952	535,230	2,236,203
3. Senior Sec. Votec	297,108	330,876	338,520	347,424	364,728	1,678,656
4. Senior Sec. Gen.	380,503	400,951	452,071	499,102	518,016	2,250,643
5. Academy	49,466	55,659	63,282	71,857	79,876	320,141
6. University (4+ years)	124,487	138,105	155,014	174,940	194,956	787,502
Total	2,602,325	2,569,093	2,396,272	2,551,725	2,528,313	12,647,728

DEMAND

Level of Education	1989	1990	1991	1992	1993	Total
1. Primary + Below	1,045,555	1,064,345	1,083,472	1,102,944	1,122,765	5,419,081
2. Junior Sec. Total	445,527	478,963	514,908	553,551	595,094	2,588,044
3. Senior Sec. Votec	317,827	342,226	368,499	396,789	427,250	1,852,591
4. Senior Sec. Gen.	259,908	282,117	306,224	332,391	360,794	1,541,434
5. Academy	69,212	75,611	82,601	90,237	98,580	416,241
6. University (4+ years)	82,130	96,417	113,189	132,879	155,994	580,610
Total	2,220,158	2,339,679	2,468,894	2,608,792	2,760,478	12,398,001

Source: Depnaker (1991).

Table 3

Net Shortage or Surplus Annually by Education Level
Estimated by the Manpower Requirements Approach
 Shortage () or Surplus +

BALANCE

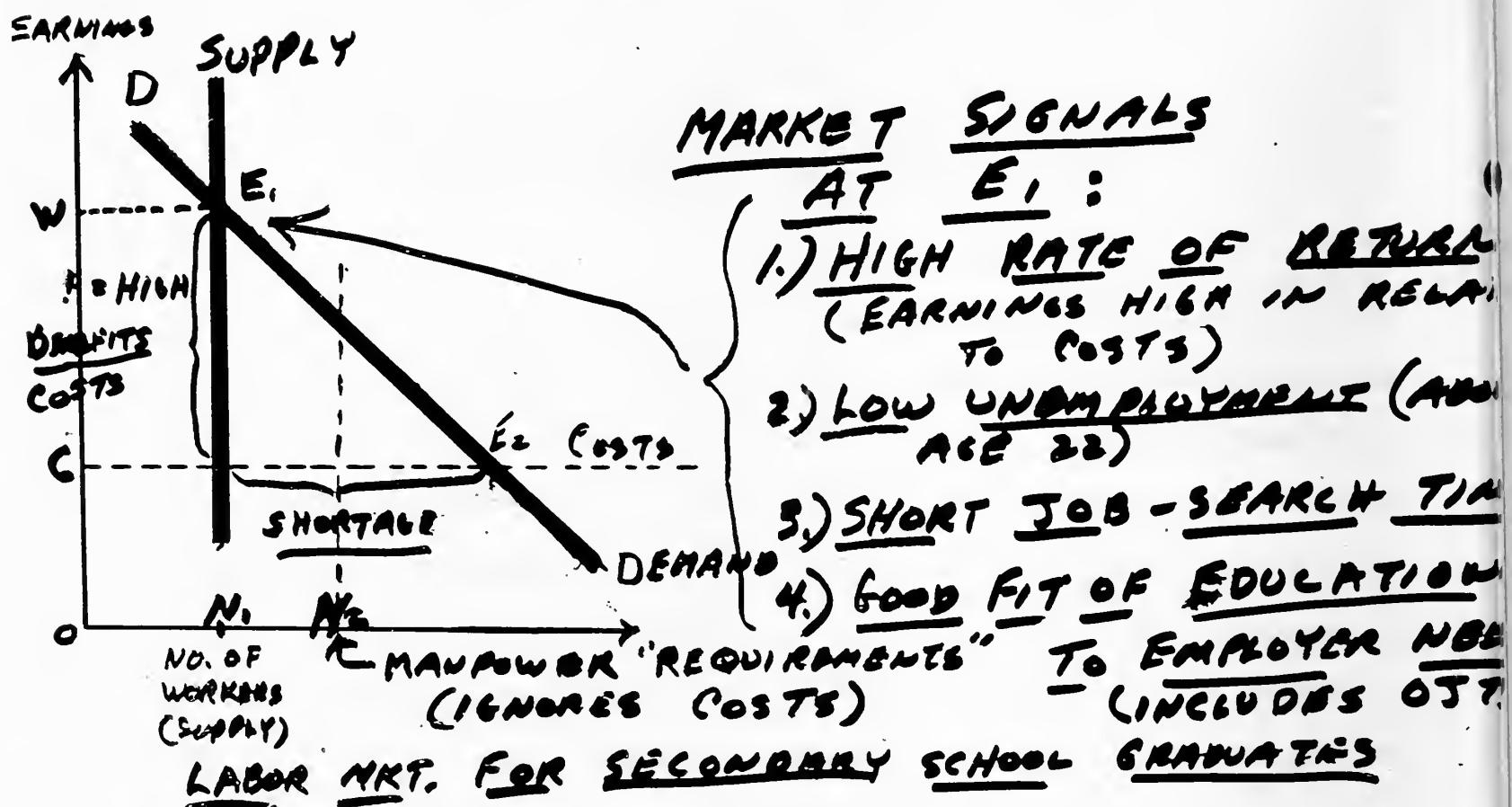
<u>Level of Education</u>	1989	1990	1991	1992	1993	Total
1. Primary + Below	+280,460	+138,809	(21,015)	(155,493)	(287,259)	(44,498)
2. Junior Sec. Total	(20,782)	(38,616)	(189,981)	(42,599)	(59,864)	(351,841)
3. Senior Sec. VOTEC	(20,719)	(11,350)	(29,979)	(49,365)	(62,522)	(173,935)
4. Senior Sec. Gen.	+120,596	+118,834	+145,847	+166,710	+157,222	+709,209
5. Academy	(19,746)	(19,951)	(19,319)	(18,380)	(18,704)	(96,100)
6. University (4+ years)	+42,357	+41,688	+41,825	+42,060	+38,962	+206,892
Total	+382,157	+229,414	(72,623)	(57,066)	(232,165)	+249,727

Source: Depnaker (1991).

FIGURE 3

MANPOWER DEMAND AND SUPPLY:

A NEW VIEW



MANPOWER "REQUIREMENTS" APPROACH: EMPHASIZE QUANTITIES ON THE HORIZONTAL AXIS

SHORTAGE: "REQUIREMENTS" (N_2) MINUS SUPPLIES (N_1) UNDERESTIMATE (COSTS IGNORED, EMPLOYER UPGRADING OF SKILLS DEMANDED NOT ANTICIPATED, ETC SUBSTITUTION NOT ANTICIPATED AS PRICE FALLS)

COST/BENEFIT / MARKET SIGNALS:

VERTICAL AXIS

1. MKT. EARNINGS HIGH (W)
MKT. DETERMINED COSTS LOW (C) } RATE OF RETURN H.

2. MARKETS RELATIVELY TIGHT

POLICY IMPLICATION: EXPAND TO MEET NEEDS, (OR TO BREAK MONOPOLY) UNTIL NET RETURNS ARE LOW

Technological progress occurs, contributing to rising productivity over time. This raises earnings, and is partly attributable to education due to the embodiment of technology in human capital through education. This is another factor that is not considered by the fixed coefficient manpower requirements approach in estimating manpower requirements. It also is not reflected in the cross section data used for rate of return estimates.

But if this effect of technical change on productivity growth that increases earnings just offsets the influence of factors other than education whose influence should be removed from earnings, then the direct observations of earnings lead to the best approximation of the true rate of return to education. This is what is assumed here (i.e., that the "alpha coefficient" equals unity), with the growth of earnings due to technical change approximately offsetting the influence of ability and other factors on earnings. This direct use of observed realizations is a common position taken by many (but not all) specialists in the field based on the more recent research.¹ See Rosen (1987, p. 299) for example who says "Corrections for self-selection bias arising from the correlation between years of school completed and measured ability suggest that a relatively small adjustment is necessary (sic!). Comparisons across observed realizations are a good first-order approximation to the relevant rate of return to schooling."

In seeking to evaluate the potential effects of employer upgrading and of productivity growth due to technical change on the coefficients used in the manpower requirements estimates in Indonesia, an effect was made to consider South Korea's experience (see McMahon, Millot, and Eng, 1988, pp. 2-123, 2-128). Further study by L. Crouch and others at R.T.I. (1990) in greater depth also confirm that the "industry-education" coefficients are by no means fixed, and that changes in the education profile of the labor force are not solely due to shifts in the sectoral structure of the economy. Looking at Korea's technical coefficients does add perspective therefore. But it cannot be assumed that future changes in technology, or Indonesia's comparative advantages as development occurs, will exactly parallel those experienced by South Korea, or other Pacific Rim countries.

Nevertheless it would appear from these comparisons to South Korea and Pacific Rim countries that now that universal education through grade 6 has been achieved, junior secondary and senior secondary education seems to be what requires the greatest emphasis in a country such as Indonesia. At least that seems to be where the greatest percentage expansion occurred in other countries prior to their rapid economic development.

II. Market Signals: The Evidence

But what do the market signals specific to Indonesia say? At the junior secondary level they reflect high earnings and low costs of education summarized in the relatively high real rates of return of 13% at this level in 1988, falling to 11% in 1989, but still 2 percentage points above the real rates of return to investment in physical capital (See Table 4). Consistent with this, the unemployment rates are lowest here of all education levels except primary, and this unemployment is almost all concentrated in the under 25 age ranges (Table 5).

Table 4

Real Rates of Return to Investment in Education
and in Physical Capital

1982-1984^a

Nationwide, Urban Workers, Male and Female^{b,c}

	<u>All Jobs</u>			<u>Main Job Only</u>			
	1982	1986	1987 ^f	1988	1988	1989 ^h	1990
	Industry Only						

Returns to Human Capital:

Primary, and Under ^d	13%	16%	11%	12%	13%	5%	
Junior Secondary ^e	17%	14%	14%	13%	13%	11%	
Senior Secondary General	22%	16%	12%	7%	13%	12%	
Senior Secondary Vocational							
Industrial (STM) ^g	12%	-	-	-	-	-	
Commerical (SMEA) ^g	20%	-	-	-	-	-	
Teachers (SMKK) ^g	16%	-	-	-	-	-	
Academy (3 years)	13%	10%	6%	9%	12%	8%	
University (4 years)	11%	7%	6%	4%	5.5%	8%	

Returns to Physical Capital

Average Real Rate of Return	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%
Annual Real Return	.8%	9.0%	9.7%	13.6%		12.2%	9.4%
Nominal Interest Rate ^g	10.5%	18.2%	19.0%	19.7%		19.3%	18.9%
Less the Inflation Rate	9.7%	9.2%	9.3%	5.6%		6.1%	9.5%

Sources: a) 1982 SUSENAS, 1986, 1987, 1988, and 1989 SAKERNAS. From McMahon and Boediono (1990, Tables 1, 2, and 3 for 1982 and 1986) and as computed from 1987, 1988, and 1989 SEKERNAS tapes for this paper.

b) Farmers removed since their earnings misrepresent their productivity.

c) All years are arithmetic averages of male and female rates of return.

d) Means of "Some Primary" plus Primary, and of Junior Secondary General and Junior Secondary Vocational, respectively.

e) Males only for 1987, and means for the four regions of Jakarta, Sumatra, Central Java, and Sulawesi. New cost data on actual (vs. budgeted) expenditures was collected for these four regions only, and used as benchmarks for 1987 and thereafter. No nationwide rates were computed for 1987.

f) From Central Bureau of Statistics (BPS).

g) B.P.S. separated the three types of Senior Secondary Vocational schools shown in 1982, but did not do so in the 1986-1989 SEKERNAS surveys.

h) For the earnings and cost data underlying these rate of return computations, see Table 11 in Appendix A.

Table 5

UNEMPLOYMENT AS A FUNCTION OF AGB (JOB SEARCH TIME)

NATIONWIDE, URBAN AND RURAL, 1988
(NUMBER OF CASES IN PARENTHESES)

EDUCATION LEVEL	AGE	ALL AGBS SINCE GRADUATION										
		11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Primary	2.0% (3633)	3.2% (7237)	2.1% (5946)	0.8% (6919)	0.6% (6172)	0.3% (4987)	0.3% (3618)	0.3% (2906)	0.4% (1854)	0.3% (1213)	0.1% (724)	1.4% (724)
Junior Sec.	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65	15-65	
Gen.	7.2% (2613)	9.2% (1947)	3.7% (221)	1.6% (1531)	0.9% (1407)	0.4% (1148)	0.4% (759)	0.3% (653)	1.3% (341)	2.3% (158)	0% (87)	4.5% (87)
Voc.	9.0% (188)	8.6% (221)	5.3% (247)	1.0% (238)	0.7% (283)	0.1% (188)	1.0% (168)	1.0% (97)	4.1% (51)	3.9% (51)	0% (29)	3.6% (29)
Senior Sec.	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-65	18-65	
Gen.	40.2% (1842)	22.3% (1889)	4.7% (1031)	2.8% (744)	1.0% (574)	0.9% (460)	1.4% (289)	2.5% (119)	0% (39)	0% (9)	17.8% (9)	
Voc.	35.7% (1187)	13.6% (1519)	3.2% (1215)	0.9% (1029)	0.3% (709)	0.6% (483)	0.3% (336)	0% (153)	0% (42)	0% (13)	10.3% (13)	
Academy	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	21-65		
University	29.2% (120)	10% (229)	3.1% (128)	0% (130)	2% (106)	0% (90)	0% (44)	0% (10)	0% (3)	7.4% (3)	22-65	

Also consistent with "tight" labor markets at this level are the short job-search times for junior secondary school leavers, with 93% finding jobs within 3 months or less (Table 6). And at the senior secondary general level, the real rates of return are equally high (12% in real terms in 1989 in Table 4) with low unemployment rates shown in Table 5 after age 26.

What is one to believe? The record of inconsistencies in forecasting manpower requirements using fixed coefficients, or even dynamic coefficients that attempt to anticipate employer upgrading of skill requirements, productivity growth, and shifts in technology is well known internationally (see Hincliffe, 1987, p. 323 and Hollister, 1965). The market signals on the other hand (Tables 4, 5, and 6) although not perfect, do report the emerging needs for labor with different levels and types of skills in a market-oriented economy. The somewhat higher rates of return in 1982 are due in part to the fact the 1982 SUSENAS asked about earnings not on the main job, but also on all other jobs, which was not done in 1986-89. (A request has been made to B.P.S. to repeat this distinction annually.) The rates of return in the latter period therefore may be somewhat understated. When these signals report the same pattern over a period of years (Table 4), and also are consistent with different labor market signals about unemployment rates and length of job search time (Tables 5, 6, and tracer studies), the credibility of an approach that places greater reliance on the wisdom of employers in choosing what they need and on the annual monitoring of market signals for the purposes of educational medium term budget planning is considerably enhanced.

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The market signals do not give precise quantitative targets for the number of students at each level. But what is more important for educational planning, and for planning for at least minimal quantities of each VOTEC skill, is the expenditure of funds to be made at each level. This will determine the extent to which there is a partnership with the parents, helping them to leave their children in school (hence determining enrollments) as well as the quality of the schooling which is what makes it attractive. If there is only planning for numbers of children not accompanied by the planning of the financial investment needed, then the quality of the education deteriorates. This is what has happened throughout the 1980's in many developing countries (See McMahon, 1990, and Heyneman, 1990).

Since resources are scarce, and funds are limited, priorities must be set for the rates of increase at each level, and for each type of education. This is exactly what the monitoring of longer term patterns in the market signals is best equipped to do. It should not be based on a single year's reading, since aberrations in the data can occur due to short lived recessions, or other factors, and investment in human resource development is a longer term investment process. But when a pattern emerges from several years of nationwide stratified random samples reporting on earnings, and costs of education, from which net rates of return can be calculated as part of a pattern of consistent market signals, there is a basis for using these to influence medium term budget planning and investment priorities.

Table 6

JOB SEARCH DURATION, IN MONTHS, 1988 1
(Number of Cases in Parentheses)

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Primary	57.5%	23.6%	13.4%	3.9%	0.8%								100%
Age (11-15)													
Cases	(73)	(30)	(17)	(5)	(1)								(127)
Junior Sec. Gen.	48.2%	21.9%	19.0%	4.0%	3.6%	2.6%			0.4%	0.4%			100%
Age (15-19)													
Cases	(132)	(60)	(52)	(11)	(10)	(7)		(1)	(1)				(274)
Junior Sec. Voc.	50%	13.3%	30%	3.3%	3.3%								100%
Age (15-19)													
Cases	(15)	(4)	(9)	(1)	(1)								(30)
Senior Sec. Gen.	37.9%	21.2%	18.5%	6.9%	3.5%	7.4%	1.3%	0.8%	1.7%	0.3%	0.1%	0.3%	100%
Age (18-22)													
Cases	(359)	(201)	(175)	(65)	(33)	(70)	(12)	(8)	(16)	(3)	(1)	(3)	(946)
Senior Sec. Voc.	35.6%	19.8%	22.6%	5.9%	4.4%	7.9%	0.8%	0.7%	1.8%	0.5%			100%
Age (18-22)													
Cases	(216)	(120)	(137)	(36)	(27)	(48)	(5)	(4)	(11)	(3)			(607)
Academy	41.5%	22.0%	9.8%	7.3%	2.4%	12.2%	2.4%		2.4%				100%
Age (21-26)													
Cases	(17)	(9)	(4)	(3)	(1)	(5)	(1)		(1)				(41)
University	51.4%	18.1%	18.1%	5.6%	4.2%	1.4%							100%
Age (22-27)													
Cases	(37)	(13)	(13)	(4)	(3)	(1)							(72)

From this point of view the decision to seek Universal Basic Education through the junior secondary level within the time frame of Repelita V has proven to be consistent with the market expressed priorities for labor well trained at this level (see McMahon and Boediono, 1988). Hence it was a wise decision. Specifically, the goal was set to increase the net educational participation rate from 54.2% in 1988 to 85% of the 13-15 year old age cohort by 1993. (The primary school net participation rate has been nearly 100% since 1988). This goal implies increasing the enrollments at this junior secondary level by 2 million by 1993 and the operating budgets for junior secondary schools by approximately 1,316 billion rupiah in 1991 prices, i.e., by 461,750 Rp per child times 2 m. children. These goals are of course meaningless (and will merely lead to a deterioration in the quality of junior secondary education unless the necessary financing is provided. As shown in Table 4, the real rate of return of approximately 11% (or 21% expressed in current prices), even though it has fallen a bit in 1989, is still substantially above the 9.7% average real rate of return to investment in physical capital in Indonesia throughout this 1982-1990 period. So given the strong economic growth in Indonesia in 1990-1991 and the commitment to provide the necessary financing, it would appear that this particular Repelita V "Universal Basic Education" through grade 9 goal continues to be not only a wise investment strategy, but is also realizable if the necessary budgetary commitment is made by 1993.

As mentioned above, there is independent evidence that the labor markets at this junior secondary education level remain relatively tight. In the 1988 and 1989 SAKERNAS surveys, as shown in Table 5, the unemployment rate of 4.5% for junior secondary general graduates at all ages is lower than at any level other than primary. But looking more closely, almost all of this unemployment is concentrated at the younger 16-25 age ranges. After age 25, the unemployment is negligible.

Further detail on of the "tightness" in the labor markets at this junior secondary level is offered in Table 6. The job search time is shorter at this level than at any other level of education except for those with primary education only. 48% to 50% have a job within one month, and 70% with junior secondary general or 63% with junior secondary vocational have a job within 2 months. 90 to 100% have a job within 3 months. It takes about 4 months before 90% have jobs at the senior secondary and college levels.

We stress this consistent evidence of relatively high real rates of return and of relative tightness in the labor market at junior secondary level from 1982 through 1989. Indonesia has long had essentially universal basic education for both males and females through grade six (a 96.2% primary school participation rate in 1988 with 26,444,756 pupils enrolled, to be precise). This has resulted in the high 31.3% of the labor force that had completed 6 years by 1986 as was shown in Figure 1 in the upper left panel. This means that the manpower planning technical coefficients based on this Indonesian historical data that are currently used, whether dynamic or fixed, will merely reflect this long-standing pattern of inadequately trained workers that employers are forced to use (i.e., illiterates with less than primary, and primary school leavers). This past historical situation does not reflect the realistic emerging needs of a growing Indonesian economy. As these fixed technical coefficients are applied to this historical data for Indonesia to estimate the growth of employment opportunities (See column (2) in Table 7), they operate to reproduce the current practice of

Table 7

Projection of Manpower Supply and Demand, 1988-1993
 (Thousands)

Education Level	<u>Graduate Output</u> (1)	<u>Employment Opportunities</u> (2)	<u>Net Shortage (-) or Surplus (+)</u> (3)
Less than primary	1,817 + 15.3%	-2,945 - 25.6%	1,128
Primary (SD)	2,530 + 21.4%	8,429 + 73.2%	-6,345
Jr. Secondary	2,257 + 19.0%	2,546 + 22.1%	-289
Sr. Sec. Gen. (SMA)	2,191 + 18.5%	1,412 + 12.3%	779
Sr. Sec. Tech + Com	2,042 + 17.2%	1,551 + 13.5%	491
Academy (S-0)	393 + 3.3%	344 + 3.0%	50
University (S-1)	630 + 5.3%	173 + 1.5%	457
Total	11,862 100%	11,511 100%	351

Source: BAPPENAS/DEPDIKBUD/DEPNAKER/BPS (1989, p. 36).

employers and thereby reproduce the educational inadequacies from the past. (Compare the percentages in column 2 of Table 7 to the percentages currently at each education level in Figure 1.) (See also Part I above.)

The major point here is that cost benefit and additional market signals continue to be consistent with pressing forward toward the goal of Universal Basic Education. This implies the largest percentage increases in investment expenditure (and by implication still larger increases in the numbers of students) at this junior secondary level, but also the desirability of continuing to monitor the market signals as time passes.

Senior Secondary Education

The pattern from 1982 through 1989 reveals that there is still a good 12% rate of return to investment in senior secondary general education and 6% to investment in senior secondary vocational education in 1989. The former is just above the 9.1% average real rate of return to investment in physical capital over these years. But the rates of return to both are declining. Earnings fell 15-22% during this period in relation to these with no school (World Bank, 1991, Table 1.12) and Table 1 above. This is in part because of tight budgetary and monetary policies, leading to decreased demand for urban labor and hence to some labor market slack in the late 1980's. On the demand side there was also a shift toward growth of export demand for lower skilled labor intensive types of employment. But on the supply side there was also a faster growth in the labor force from 1986 to 1989 at the senior secondary school and college levels faster than at the junior secondary level (See Figure 1). This rapid increase in supply depressed wage rates at these more advanced levels.

These earnings trends are reflected in a pattern of declining rates of return seen in Table 4 (1986-89 focuses consistently on earnings on the first job only), a pattern that can be seen to be repeated in all of the provinces in Table 8. It is remarkable that the highest rates of return to senior secondary investment are in the Other Islands (21% and 19%). Also investment in senior secondary general education still pays slightly better than investing in the expansion of VOTEC everywhere except Yogyakarta and Sulawesi, presumably because the senior secondary general graduates are more adaptable in adjusting to specific labor market needs.

Unemployment and Job-Search Times. Unemployment rates among senior secondary general graduates of 17.8% and among VOTEC graduates of 10.3% are higher than at any lower levels as seen in the last column of Table 5. But this unemployment is almost entirely concentrated in the younger ages, as is dramatically illustrated below in Figure 4 (based on Table 5). By age 26, only 3 to 4% of all senior secondary graduates are unemployed and extremely low employment rates of 1 to 2% persist on up to age 65. As seen in Table 6, this is due in large part to long job search times. Although 77.5% of the secondary academic graduates and 73.3% of the VOTEC graduates who look have jobs within 3 months, there is an unusually large 7.9-12% that take 6 months or longer to secure a job. This has variously been attributed to a high reservation wage that is adjusted downward only slowly by the graduate as the realities of the job market are learned (Van Adams, 1991, p. 15). It has also been attributed to the slow processes of bureaucracy coupled with relatively well to do parents that

Table 8

REAL RATES OF RETURN BY REGION
ALL URBAN WORKERS- MALE AND FEMALE

Level of Education	Jakarta			West Java			Central Java		
	1982	1986	1988	1982	1986	1988	1982	1986	1988
	1. Primary + Below	0.17	0.17	0.16	0.15	0.17	0.14	0.12	0.16
2. Junior Secondary	0.23	0.10	0.24	0.13	0.15	0.11	0.25	0.13	0.12
3. Senior Sec. Gen.	0.28	0.19	0.10	0.21	0.13	0.12	0.31	0.17	0.12
4. Senior Sec. Voc.	0.08	0.20	0.07	0.15	0.18	0.09	0.11	0.16	0.09
5. Academy (3 years)	0.30	0.07	0.11	0.14	0.13	0.08	0.09	0.10	0.09
6. University (4+ years)	0.18	0.11	0.07	0.10	0.09	0.06	0.08	0.05	0.09
Level of Education	Yogyakarta			East Java			Sumatera		
	1982	1986	1988	1982	1986	1988	1982	1986	1988
	1. Primary + Below	0.12	0.15	0.17	0.12	0.18	0.10	0.25	0.16
2. Junior Secondary	0.17	0.18	0.15	0.18	0.14	0.13	0.18	0.13	0.12
3. Senior Sec. Gen.	0.29	0.15	0.08	0.29	0.13	0.12	0.11	0.14	0.10
4. Senior Sec. Voc.	0.13	0.10	0.11	0.10	0.09	0.08	0.10	0.14	0.06
5. Academy (3 years)	0.10	0.09	0.05	0.10	0.12	0.05	0.14	0.14	0.03
6. University (4+ years)	0.13	0.09	0.04	0.20	0.04	0.04	0.10	0.08	0.03
Level of Education	Kalimantan			Sulawesi			Other Islands		
	1982	1986	1988	1982	1986	1988	1982	1986	1988
	1. Primary + Below	0.12	0.18		0.13	0.18	0.13	0.17	0.14
2. Junior Secondary	0.15	0.12		0.10	0.15	0.15	0.12	0.17	
3. Senior Sec. Gen.	0.17	0.17		0.15	0.13	0.06	0.23	0.21	
4. Senior Sec. Voc.	0.09	0.10		0.08	0.15	0.08	0.17	0.19	
5. Academy (3 years)	0.11	0.06		0.06	0.09	0.09	0.16	0.16	
6. University (4+ years)	0.08	0.05		0.09	0.10	0.03	0.12	0.06	

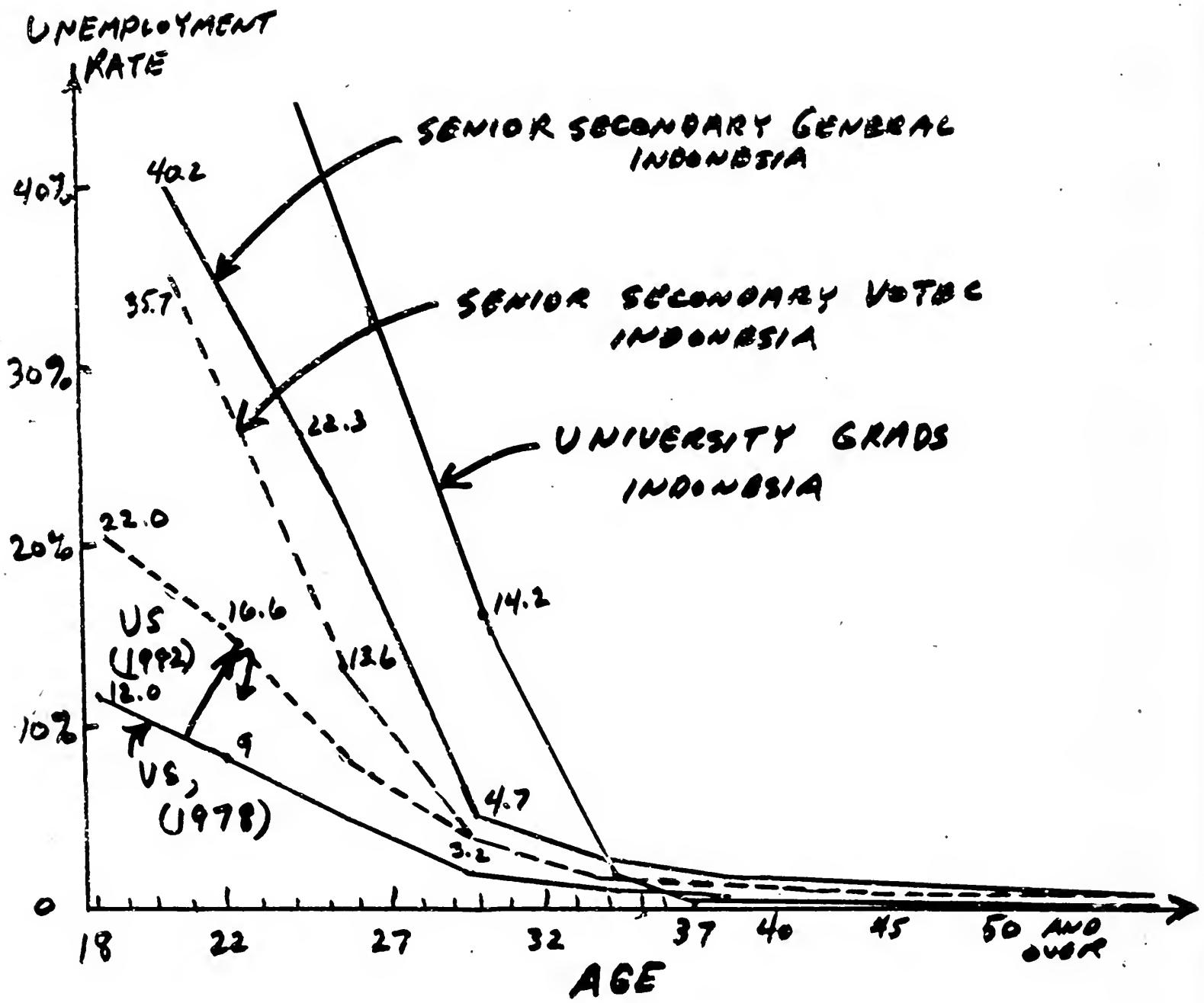


FIGURE 4

UNEMPLOYMENT OF GRADUATES

A FUNCTION OF AGE AND JOB SEARCH TIME

SOURCE: INDONESIA: SAKERNAS 1988 (TABLE 2 ABOVE)
 USA: W.W. McMAHON (1987, p.184)

permit some to queue for better paying government jobs (Simanjuntak, 1987 and David Clark), and to problems with the internal quality and external efficiency of the education system (Godfrey, 1987).

This pattern of high unemployment rates at the younger ages among secondary school graduates with rates that fall sharply after about age 25, is typical of other developing countries as well as of the U.S. Figure 4 also shows how unemployment rates at each age shift upward during a recession (1982 was a recession year in the U.S) and back down afterward, even though the same pattern of high unemployment rates and larger job search times at the younger ages persists both during recession and recovery. Finally, it is clear however that the unemployment rates at the school leaving ages among secondary school and college graduates are much higher in Indonesia than in the U.S, as can be seen in Figure 4. This suggests that there is a case to be made for improving the quality and employability of the graduates, as well as improving the efficiency with which the job placement centers for secondary school and college graduates operate.

Senior Secondary Vocational

There is also a case to be made based on these market signals for a continuing expansion of senior secondary vocational education (See Tables 4-6). But the data do not support a percentage rate of expansion of VOTEC that is faster than the rate of expansion of investment in senior secondary general education. The rates of return are not higher and the unemployment rates and job search times are not significantly smaller. This comparison is meaningful because the rates of return for the senior secondary general graduates are computed only for that subset that did not go on to college. There is no reason to think that their ability-level is higher than that of the VOTEC graduates therefore. If it were possible to measure innate IQ (which it is not), it might even be that the innate IQ of the VOTEC students is higher than that of the senior secondary general school leavers who did not make it into any college.

Table 9 suggests some possibilities for improving the efficiency of senior secondary vocational schools. Table 4 breaks down the relative rates of return for SMT, SMEA, and SMKK schools in 1982, and reveals that the highest net returns are to the business and accounting programs (SMEA). But the data do not permit this breakdown in the later years. When these net returns are broken down by Regions, it is clear from Table 9 that the VOTEC rates of return are highest for males in West Java (24%). Visits to the schools there should reveal what they are doing that makes them so effective. This could suggest improvements that could be made in places where the rates of return are lower, such as in the Other Islands (8%), East Java (8%), and Sumatra (10%). Possibilities that may be found where the rates of return are high include economies of scale (consolidation of overly detailed curricula), underexpansion of VOTEC in these high return areas, and technologically progressive curricula (See McMahon, Jung, and Boediono, 1991). Ade Cahyana (1991) is just completing a large study of VOTEC graduates from schools in West Sumatra, East Java, and the Other Islands (NTB) which develops additional ways of improving VOTEC quality and cost effectiveness.

Table 9 Social rates of return to senior secondary vocational vs.
senior secondary general schools, 1986 (Number of cases in parentheses)

Province	Males		Females	
	General	Vocational/ technical	General	Vocational/ technical
Jakarta	14 % (412)	14 % (158)	24 % (69)	25 % (62)
West Java	9 % (177)	24 % (217)	17 % (71)	11 % (123)
Central Java	12 % (199)	14 % (153)	22 % (60)	18 % (94)
Yoguakarta	15 % (58)	NA (49)	NA (14)	10 % (25)
East Java	11 % (75)	8 % (108)	15 % (23)	10 % (59)
Sumatra	11 % (347)	10 % (258)	17 % (82)	18 % (170)
Kalimantan	13 % (154)	11 % (132)	21 % (28)	9 % (63)
Sulawesi	14 % (210)	11 % (138)	12 % (74)	19 % (97)
Other Islands	19 % (164)	8 % (253)	22 % (60)	29 % (127)

Note. NA: not available

College Graduates

The story is much the same at the Academy and University levels as it is at the senior secondary level. Real rates of return are lower, and have fallen nationwide (Table 4) from 1982 through 1989. This has been occurring in all of the regions (Table 8). The high unemployment rates for university graduates are heavily concentrated in the 22-26 age group, but many of these may still be in school and searching for a job at the same time (Table 5). There is a much smaller 10-14% of college graduates unemployed in the age 26-30 age group, and the unemployment rate falls to 1.2% and then to 0% above age 32. 41% to 51% of Academy and University graduates respectively have a job within one month, but about one-third experience a job-search time of 3 months or longer (Table 6).

The low rate of return at the university level (and the high unemployment rates from age 22-26) are partly due to the excessively long 7 to 10 years that it is taking to complete a 4 year university degree, since this runs up the costs. It also reflects the rapid rate of expansion at this level of the supply of college graduates (See Figure 1). This all suggests that it is important to concentrate on improving the quality and efficiency of the education, and hence the earlier employability of college graduates. A slower rate of expansion in investment expenditure at the college and university level than at the junior secondary level is appropriate, with a larger proportion of the improvement in college quality financed through resource recovery from parents paying tuition and fees (coupled with grants for students from low income families), and through greater efficiency by reductions in the 7-10 years it takes to graduate. It would also help if the control over access by employers were shifted from academic department heads, and the responsibility of the college placement offices for placing students (as distinguished from alumni) were stressed.

III. Summary and Conclusions: Market Signals and Educational Investment

The results of this analysis of what the market signals say and their implications for an efficient educational investment strategy are summarized in Table 10. Our "new view" of this process is compared to the various manpower "requirements" and supply estimates that were discussed earlier. The objective here is to offer a practical method for making budget allocations so that central manpower planning of specific quantities is not just abandoned with nothing to put in its place.

First, since the overall growth of real GDP has averaged 6% in Indonesia over the last decade, the rate of increase in investment in education should increase faster than that, perhaps by 7.7% per year on the average in real terms as shown in column 6 of Table 10. This is partly because the overall income elasticity of expenditure on primary and secondary education is approximately unity in most western market economies (implying a rate of expansion of 6% in expenditure is necessary to maintain competitive salaries and educational quality). But this is in countries where universal education through grade 12 has already been attained, which is not the case yet in Indonesia. The income elasticity of effective demand for higher education in the U.S. is greater than unity. But even more significant, the average rate of increase in investment in education, should be slightly larger than physical capital investment growth to

Table 10

COMPARISON OF MARKET SIGNALS AND MANPOWER D+S RESULTS AND THEIR IMPLICATIONS
BY EDUCATION LEVEL

Market Signals			Manpower Requirements			Illustrative Implications @		
Real Rates of Return	Unemployment	Median Job Search Time	in Thou. 1989 - 93	Rep V	Rep '91	Market Signals	Rep V	Market D+S
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)
Primary & Under	13%	7%	1.0	-5,217	-45	7%	11%	7%
Junior Secondary	13%	2.6%	1.2#	-289	-353	11%	7%	10%
Senior Sec. Gen	13%	3.7%	2#	779	+705	10%	3%	3%
Senior Sec. Voc	10%	2.0%	2#	491	-174	9%	4%	7%
Academy (3)	12%	6.5%	2#	50	-36	5%	5%	5%
University (4+)	5.5%	7.6%	2#	457	+207	4%	4%	4%
Overall Averages								
Human Capital	11%	(1986)				7.7%	5.6%	6%
Physical Capital	9.1%	(1982-90)		1.7#				
Real GDP Growth					6%			

Notes : @ These assume an average growth rate of real GDP of 6%. The actual rates were for 1975-80 = 6.8%, 1981-1990 = 5.5%, and 1986-90 = 6%, source BPS, as quoted in World Bank (1991, p.16)

Sources . Market Signals : Tables 1,2,3 above.

Manpower Requirements : Repelita V as published in BAPPENAS/DEBIKEBU/DEPNAKER/BPS (1989, p.36)
Revision '91 as published in Depnaker (1991, p.27).

approach an optimal allocation because the real social rate of return to education of 11.9% on the average (See Table 10) is above the 9.1% average real rate of return to investment in physical capital in most years (See Table 4).

Since this 11.9% does not include any private non-monetary benefits of education (better health of children, etc.), or externality spillover social benefits (e.g., a significant contribution to lower fertility and population growth rates, provision of a better basis for democracy, etc.), but instead includes only the contribution to labor market measures of National Income (and Product) growth, it if anything understates the true return to investment in education.

This all suggests that a higher rate of increase in investment in education is required for an efficient investment strategy (i.e., on efficiency grounds). Furthermore, Indonesia's National plus local investment in education as a percent of GDP (which was about 3.5% in 1988), and the Central Government's expenditure on education as a percent of GDP (2% in 1988) are the lowest in comparison to all of the Pacific Rim Countries (See Boediono and McMahon, 1990, Figures 1 and 2). South Korea's experience as mentioned above was one of a large increase in junior secondary and senior secondary school investment prior to rapid growth take off. Enrollment rates in all secondary education rose from 35% in 1965 to 56% in 1975 (See Figure 1 above, and World Bank, 1991, p. 60). All of these points suggest that a rate of increase in real investment in education higher than 6% is called for on efficiency grounds, and is probably a necessary condition for a take off into sustained faster per capita labor productivity growth and hence sustained economic growth.

Second in comparison to the average rate of expansion in real terms (here 7.7%) the social rates of return in Col. 1 of Table 10 and the other market signals reflecting the relative "tightness" of the labor markets indicate where the priorities for expansion lie. Clearly the market signals suggest junior secondary should have highest priority (say 11% annual increases in real expenditures), senior secondary general the second highest (say 10%) and senior secondary vocational the third highest (say 9%), all higher than the average 7.7% rate of expansion of investment expenditure in real terms. Lower rates of increase in investment in real terms are called for at the primary level, say 7%, given that there are needs for free textbooks, higher 6th grade completion rates in the rural areas, and improved quality, but also given that universal primary education has already been attained. Optimum rates of expansion of investment would be lower at the college level (say 4% or 5%) where the rates of return are the lowest, and falling, and the unemployment rates and job search times are the largest.

These priorities are the same in certain respects, but also are somewhat different than those suggested by the manpower requirements approach as can be seen by comparison of columns (4), (5), (6), (7), and (8) in Table 10. For whatever reason, there appears to have been significant underinvestment in this junior secondary education in Indonesia over a period of many years (See Figure 1). The revised manpower requirements are better (Col. 5, Table 10) than the original Repelita V estimates (Col. 4, Table 10). But they still would lead to some continuing underinvestment in junior secondary and serious underinvestment in senior secondary general education (Compare Cols. 6 and 8 in Table 10). The latter is not warranted by the earnings, costs, rates of return,

unemployment rates after age 25, comparisons to South Korea's experience, or other Indonesian market signals at these junior and senior secondary general education levels.

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APPENDIX A

Table 11
TOTAL SOCIAL COSTS AND GROSS AND NET RETURNS TO EDUCATION
FOR COMPUTATION OF RATES OF RETURN

EARNINGS OF ALL URBAN WORKERS, 1989

ALL PROVINCES

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COST OF EDUCATION

MEAN ANNUAL EARNINGS AT DIFFERENT AGES

AGE GROUPS

	Foregone Earnings 1989	Direct Cost 1989	TOTAL	15-20 (1)	21-30 (2)	31-40 (3)	41-50 (4)	51-60 (5)	61-65 (6)
	C	O	E	F	G	H	I	J	K

10 NO SCHOOL(M)	0.00	0.00	0.00	712.00	890.00	872.00	906.00	775.00	668.00	
11 NO SCHOOL(F)				0.00	526.00	386.00	508.00	417.00	627.00	354.00
12										
13 SOME PRIMARY(M)										
14 COST & EARNINGS	0.00	-420.75	-420.75	529.00	832.00	914.00	936.00	948.00	733.00	
15 NET EARNINGS DIF.FROM THE LAST LEV.				-183.00	-58.00	42.00	30.00	1000.00	65.00	
16										
17 SOME PRIMARY(F)										
18 COST & EARNINGS	0.00	-420.75	-420.75	394.00	384.00	435.00	417.00	448.00	321.00	
19 NET EARNINGS DIF.FROM THE LAST LEV.				-132.00	-2.00	-73.00	0.00	-179.00	-33.00	
20										
21 PRIMARY(M)										
22 COST & EARNINGS	-534.00	-844.60	-1378.60	621.00	861.00	1035.00	1216.00	1255.00	994.00	
23 NET EARNINGS DIF.FROM THE LAST LEV.				-91.00	-29.00	163.00	310.00	480.00	326.00	
24										
25 PRIMARY(F)										
26 COST & EARNINGS	-394.50	-844.60	-1239.10	415.00	506.00	555.00	610.00	1035.00	291.00	
27 NET EARNINGS DIF.FROM THE LAST LEV.				-111.00	120.00	47.00	193.00	408.00	-63.00	
28										
29 JUN. HIGH SCHOOL GEN.(M)										
30 COST & EARNINGS	-1287.15	-470.63	-1757.78	659.00	942.00	1300.00	1596.00	1951.00	1344.00	
31 NET EARNINGS DIF.FROM THE LAST LEV.				38.00	81.00	265.00	380.00	696.00	350.00	
32										
33 JUN. HIGH SCHOOL GEN.(F)										
34 COST & EARNINGS	-1075.21	-470.63	-1545.84	482.00	789.00	853.00	1663.00	1725.00	1660.00	
35 NET EARNINGS DIF.FROM THE LAST LEV.				67.00	283.00	298.00	1053.00	690.00	1369.00	
36										
37 JUN.HIGH VOCATIONAL(M)										
38 COST & EARNINGS	-1396.69	-510.84	-1907.53	506.00	924.00	1374.00	1670.00	1824.00	1341.00	
39 NET EARNINGS DIF.FROM THE LAST LEV.				-115.00	63.00	339.00	454.00	569.00	347.00	
40										
41 JUN.HIGH VOCATIONAL(F)										
42 COST & EARNINGS	-1166.72	-510.84	-1677.56	436.00	652.00	763.00	1358.00	1912.00	1440.00	
43 NET EARNINGS DIF.FROM THE LAST LEV.				21.00	146.00	208.00	748.00	877.00	1149.00	
44										
45 SEN.HIGH SCHOOL GEN.(M)										
46 COST & EARNINGS	-1764.47	-606.17	-2370.64	719.00	1101.00	1487.00	2296.00	2209.00	2380.00	
47 NET EARNINGS DIF.FROM THE LAST LEV.				60.00	159.00	187.00	700.00	258.00	1036.00	
48										
49 SEN.HIGH SCHOOL GEN.(F)										
50 COST & EARNINGS	-1247.18	-606.17	-1853.35	720.00	1039.00	1358.00	1669.00	2300.00	2254.00	
51 NET EARNINGS DIF.FROM THE LAST LEV.				238.00	250.00	505.00	6.00	575.00	594.00	
52										
53 SEN. HIGH VOCATIONAL(M)										
54 COST & EARNINGS	-2263.67	-1071.54	-3335.20	692.00	1045.00	1553.00	1985.00	2233.00	3084.00	
55 NET EARNINGS DIF.FROM THE LAST LEV.				33.00	103.00	253.00	389.00	282.00	1740.00	
56										

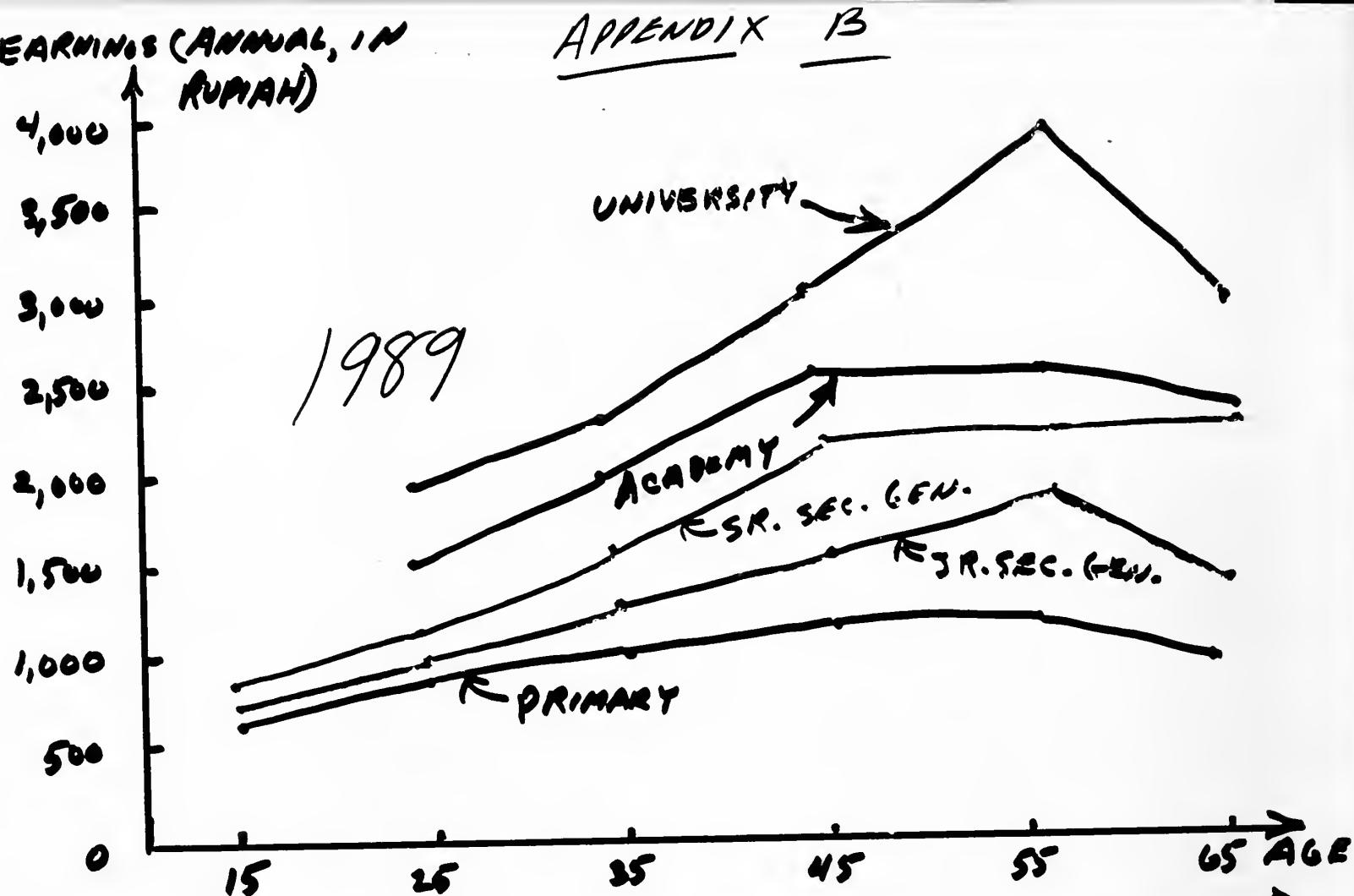
APPENDIX A (continued)

57 SEN. HIGH VOCATIONAL(F)											
58 COST & EARNINGS	-1655.67	-1071.54	-2727.21	600.00	913.00	1213.00	1744.00	1929.00	914.00		
59 NET EARNINGS DIF.FROM THE LAST LEV.				118.00	124.00	360.00	81.00	204.00	-746.00		
60											
61 TEACHERS SCHOOL (M)											
62 COST & EARNINGS	-1626.08	-657.54	-2283.63	458.16	711.58	794.17	1036.74	869.45	801.00		
63 NET EARNINGS DIF.FROM THE LAST LEV.				-200.84	-230.42	-505.83	-559.26	-1081.55	-543.00		
64											
65 TEACHERS SCHOOL(F)											
66 COST & EARNINGS	-1189.34	-657.54	-1846.88	300.00	428.72	453.88	600.00	699.96	650.04		
67 NET EARNINGS DIF.FROM THE LAST LEV.				-182.00	-360.28	-399.12	-1063.00	116.28	116.28		
68											
69 COMMERCIAL(M)											
70 COST & EARNINGS	-1645.85	-602.73	-2248.58	458.16	711.58	794.17	1036.74	869.45	800.01		
71 NET EARNINGS DIF.FROM THE LAST LEV.				-200.84	-230.42	-505.83	-559.26	-1081.55	-543.99		
72											
73 COMMERCIAL(F)											
74 COST & EARNINGS	-1203.80	-602.73	-1806.53	300.00	428.72	453.88	600.00	699.96	650.04		
75 NET EARNINGS DIF.FROM THE LAST LEV.				-182.00	-360.28	-399.12	116.28	116.28	116.28		
76											
77 ACADEMY(M)											
78 COST & EARNINGS	-1585.40	-1165.10	-2750.49		1459.00	1902.00	2509.00	2406.00	2357.00		
79 NET EARNINGS DIF.FROM THE LAST LEV.					358.00	415.00	213.00	197.00	-23.00		
80											
81 ACADEMY(F)											
82 COST & EARNINGS	-1625.40	-1165.10	-2790.50		903.00	1497.00	1855.00	3003.00	2500.00		
83 NET EARNINGS DIF.FROM THE LAST LEV.					-136.00	139.00	186.00	703.00	246.00		
84											
85 UNIVERSITY(M)											
86 COST & EARNINGS	-2944.31	-5073.92	-8018.23		1760.00	2321.00	3052.00	4025.00	3116.00		
87 NET EARNINGS DIF.FROM THE LAST LEV.					659.00	834.00	756.00	1816.00	736.00		
89											
89 UNIVERSITY(f)											
90 COST & EARNINGS	-3018.60	-5073.92	-8092.52		1419.00	1925.00	3294.00	2406.00	0.00		
91 NET EARNINGS DIF.FROM THE LAST LEV.					380.00	567.00	1625.00	106.00	-2254.00		

FOOTNOTES

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¹One recent paper, for example, by Jere Behrman and Anil Deolalikar (1990) argues that it is appropriate to control for such "other" household factors as those that relate to ability, motivation, schooling quality, and employment opportunities. The problem is that this treats the years of schooling as predetermined, focusing only on quantity and not on quality, and ignores the interaction with ability and motivation. It is well known that controlling for (error ridden) measures of ability results in a downward bias in the returns to schooling. In addition to Rosen (1987), Griliches and Mason (1988) for example also say "Using a 'clean' schooling variable, . . . we concluded that the bias in its estimated coefficient due to the omitted ability dimension is not very large, on the order of 10 percent." Furthermore, motivation and the quality of schooling are affected by the amount of investment in human capital. If motivation and quality are controlled for, removing their effects on earnings, this has the inevitable result of biasing downward the rate of return to investment in schooling, which includes direct costs and not just foregone earnings costs.



RUPIAH/YR

FIGURE 5. AGE-EARNINGS PROFILES
1989 (MALES ONLY).

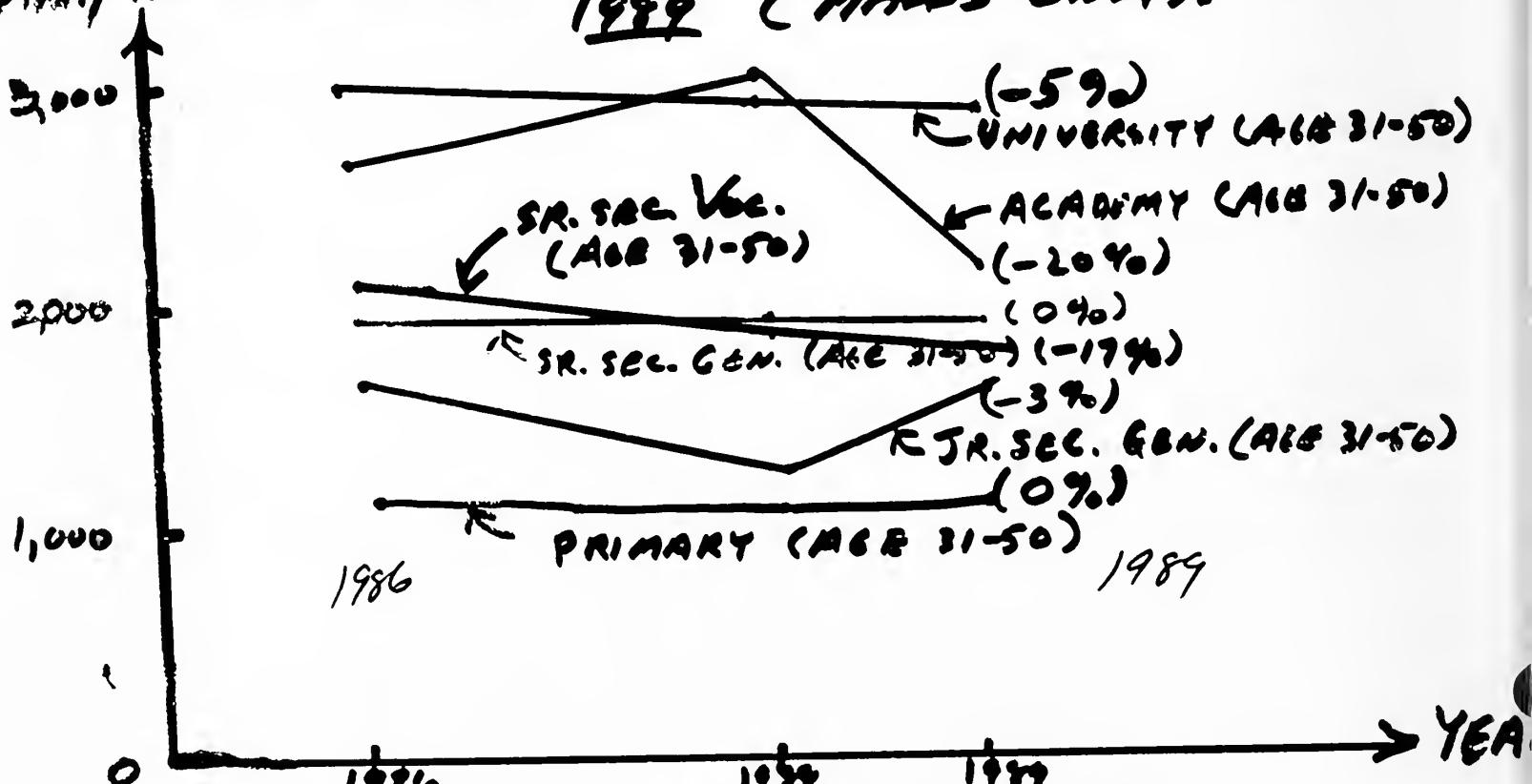


FIGURE 6. EARNINGS TRENDS
IN CONSTANT 1989 PRICES (MALES only)

SOURCE: TABLE 1

EARINGS (ANNUAL,
IN RUPIAH)

APPENDIX B
(CONT.)

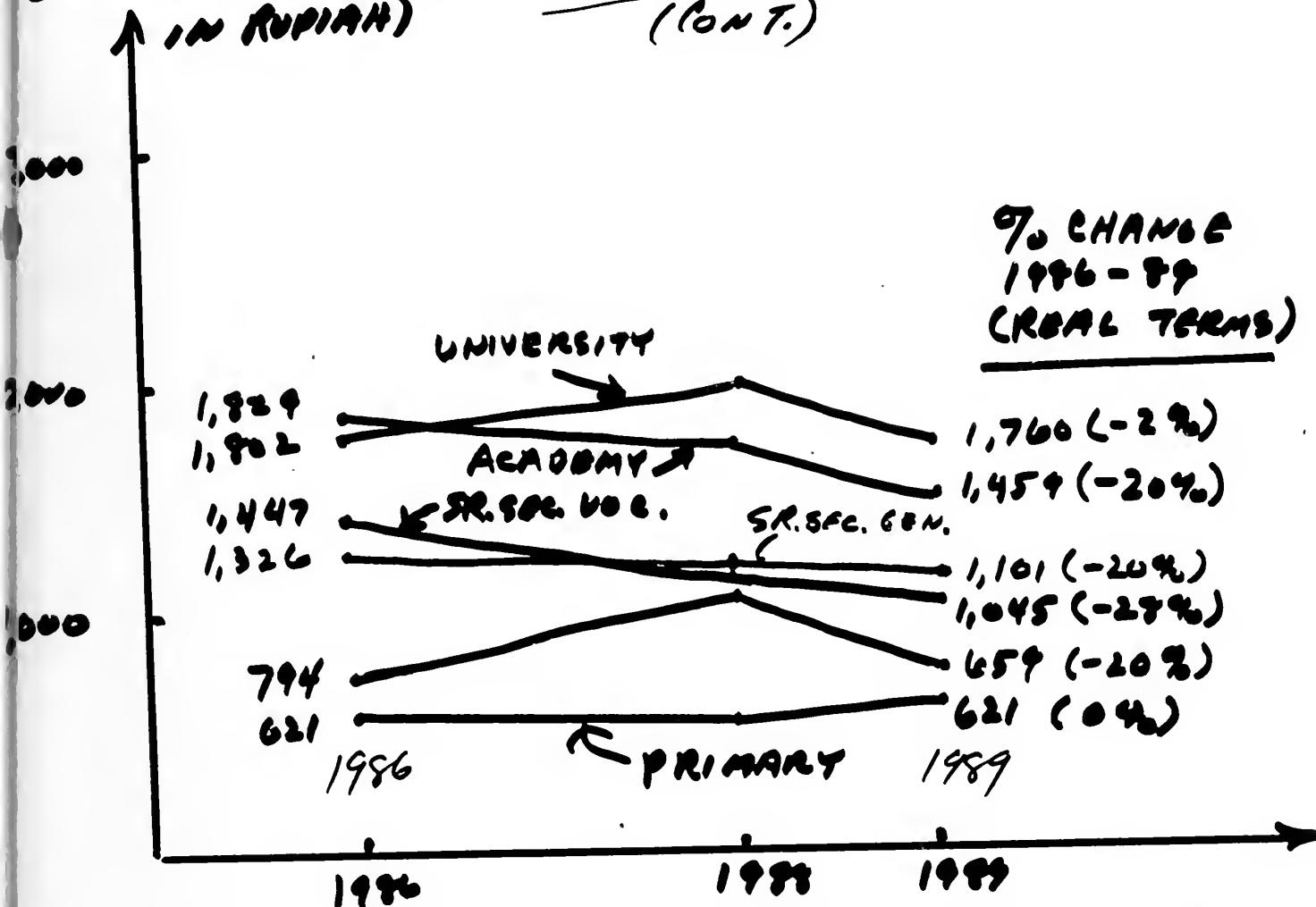


FIGURE 7 EARINGS TRENDS
SCHOOL-LEAVING AGE ONLY
IN CONSTANT 1989 RUPIAH

SOURCE: SEE TABLE 1 ABOVE.

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